

**"COMM-STOR\*" II COMMUNICATIONS STORAGE UNIT  
STATION MESSAGE DETAIL RECORDING (SMDR) FEATURE  
TESTING AND TROUBLESHOOTING PROCEDURES**

**1. GENERAL**

**1.01** This section covers the COMM-STOR II Communications Storage Unit manufactured by Sykes Datatronics, Incorporated, as described in their section SYKS 578-400-502.

**1.02** Whenever this section is reissued, the reason(s) for reissue will be listed in this paragraph.

**1.03** Testing and troubleshooting procedures for the COMM-STOR II Model 8220AS unit

for Station Message Detail Recording (SMDR) applications are contained in the attached reprint of the practice prepared by Sykes Datatronics, Incorporated. (No special equipment is required for the procedures described herein.)

**1.04** An operational checkout should be performed after installation or on trouble calls. It may be a brief checkout to ensure that the station is operable or a complete checkout to exercise all features.

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**NOTICE**

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**Comm-Stor II**  
**COMMUNICATIONS STORAGE UNIT**  
**TEST AND TROUBLESHOOTING**  
**PROCEDURES FOR THE**  
**STATION MESSAGE DETAIL RECORDING**  
**(SMDR) FEATURE**

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	Test M—RAM Memory Test	14	1.	<b>GENERAL</b>	
	Test V—Drive/Diskette Verify Test	16	1.01	This section provides testing and troubleshooting procedures for the Comm-Stor® II model 8220AS unit for Station Message Detail Recording (SMDR) applications, hereafter referred to as the Comm-Stor II/SMDR unit. No special equipment is required for the procedures described herein.	
	Test CM—Configuration Memory Test	17	1.02	Whenever this section is reissued, the reason(s) for the reissue will be given in this paragraph.	
6.	<b>CHECKLIST #1—DIAGNOSTIC DOES NOT RUN</b>	18	1.03	An operational checkout should be performed after installation or on trouble calls. It may be a brief checkout to make sure the station is operable, or a complete checkout to exercise all features.	
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1.04 With the station arrangement properly interfaced to the system where it will be used, conduct a complete checkout of send and receive capabilities. Check all operational modes in sending to or receiving from another station in the system.

1.05 On maintenance or trouble calls at a location, confine the checkout to the specified trouble area. Perform a complete checkout after an extensive repair.

1.06 If the indicated response is not obtained in any step of a checkout procedure, repeat the step to make sure that the procedure has been performed correctly. If the results are still unsatisfactory, replace the module indicated as the possible cause.

1.07 As a further aid to troubleshooting, refer to the wiring diagrams for the Comm-Stor II/SMDR unit in Section 578-400-400. For help in identifying components, refer to Section 578-400-700, *Disassembly/Reassembly and Parts*.

#### DANGER AND WARNINGS

1.08

**Danger:** *Turn off all power and signal sources before removing or replacing any module or component.*

**Warning 1:** *To avoid possible internal damage to circuitry, wear a static discharge strap connected to ground to allow static discharge before handling circuit boards or components for removal or replacement. Avoid touching circuit cards or components as much as possible.*

**Warning 2:** *Put the replaced board in a static bag immediately after removal from unit. Never handle the board outside the bag without being properly grounded.*

**Warning 3:** *Handle all diskettes with care:*

*Never touch the exposed diskette surface. Handle the diskette only near the label.*

*Do not write on the diskette cover; write only on the label using a felt-tip pen. If possible, write on a label before placing it on the diskette.*

*Do not attempt to clean a dirty or dusty diskette; such a diskette should be discarded.*

*Keep the diskette away from potentially magnetic materials (paper clips, etc.) or magnetic sources (unshielded power supplies, CRT monitors, etc.).*

*Do not bend the diskette.*

*Do not expose the diskette to extremes of heat or cold.*

*Keep the diskette in its protective cover when not in use. Dust and liquid can damage the exposed diskette surface.*

*Store diskettes vertically in boxes when not in use.*

#### 2. PRELIMINARY CHECK

2.01 Before turning on any equipment, check that the station is connected to a properly grounded AC service. Also check the seating of all circuit boards and cable connectors.

2.02 If there are operational difficulties with a Comm-Stor II/SMDR unit, external devices such as the terminal and data set should be checked, depending on the area of difficulty.

2.03 Also, a check of the Comm-Stor II/SMDR unit's variable configuration data should be made. All configuration parameters should be checked and changed if required. The parameters should then be rechecked after the unit has been off for several hours.

2.04 If difficulties are encountered with data transfers on and off a diskette, other diskettes should be tried and a check should be made of diskette handling procedures (refer to Section 578-400-202, *Installation Procedures*).

#### 3. USER DIAGNOSTIC DESCRIPTION

3.01 The User Diagnostic Kit (SYKES part number 1030A5260) consists of a special Diagnostic diskette and a 3-port EIA connector plug, revision B or greater (Fig. 1). The test procedure is automatically loaded off the diskette into the unit's memory when the test is performed.

3.02 The results of tests A-H are displayed on the front panel LEDs.

**USER DIAGNOSTIC TESTS**

- Test A—LED/Switch Test
- Test B—Hardware Features Check
- Test C—Internal Tests: Memory/Diskette/  
Timer/Bit Rate
- Test D—Terminal and Modem Port Tests
- Test E—Printer Port Test
- Test G—Configuration Memory Test
- Test H—Diskette Test
- Test M—RAM Memory Test\*
- Test V—Drive/Diskette Verify Test\*
- Test CM—Configuration Memory Test\*

\*These tests must be run with a terminal attached to the Comm-Stor II/SMDR unit.

**4. BASIC TROUBLESHOOTING PROCEDURE**

**4.01** To simplify isolating the problem area of the Comm-Stor II/SMDR unit, begin all troubleshooting procedures by loading or attempting to load the User Diagnostic diskette as described in Part 5.

**4.02** Because of the complicated interconnection of circuitry, it is recommended that a spare set of modules be used to swap/verify the operation of questionable areas as described in the User Diagnostic Procedure.

**4.03** If the unit is completely dead, or will not load and execute the User Diagnostic Procedure, refer to Table S, Checklist #1 on page 19 of this section.

**5. USER DIAGNOSTIC PROCEDURE**

**5.01** If a Comm-Stor II/SMDR unit malfunction prevents reading the User Diagnostic diskette, the READY light will blink.

**5.02** The STATUS light will blink if one of the following conditions exists:

- the binary switch is set to EXIT and the modem switch is set to 0,
- the user has inserted the incorrect Diagnostic diskette for the system being tested.

**5.03** The diagnostic test plug has two switches, numbered "1" and "2", for simulating peripheral cabling. The plug is placed over *all three* EIA ports. Figure 1 illustrates the test plug.

**5.04** The first eight tests are selected by setting the modem bit rate switch on the back of the unit (Table A). It is recommended that the LED/Switch test and the Hardware Features Check be performed *before* any other diagnostic test. Diagnostics should be performed in the order they are presented in this section.

**TABLE A  
MODEM SWITCH SETTINGS**

MODEM SWITCH SETTING	TEST
1	LED/Switch Test
2	Internal Tests
3	Terminal and Modem Port Tests
4	Reserved
5	Printer Port Test
6	Reserved
7	Hardware Features Check
8	Configuration Memory Test
9	Diskette Test

**DIAGNOSTIC TESTS**

**5.05**

**Diagnostic Start-Up Procedure**

- (a) Connect a terminal to the Comm-Stor II/SMDR unit's terminal port.
- (b) Turn the Comm-Stor II/SMDR unit ON.
- (c) Remove any diskettes from the drives. Insert the System Management diskette into drive 1. The System Management menu is displayed. Type 9 followed by a Carriage Return to refresh the system. The Refresh procedure ensures that the Comm-Stor II/SMDR unit is set to the standard factory configuration.
- (d) Type 0[CR]. Remove the System Management diskette. Insert the Diagnostic diskette into drive 1; close the drive door.

**Note:** Do not remove the Diagnostic diskette until instructed.

**Test A—LED/Switch Test**

**5.06**

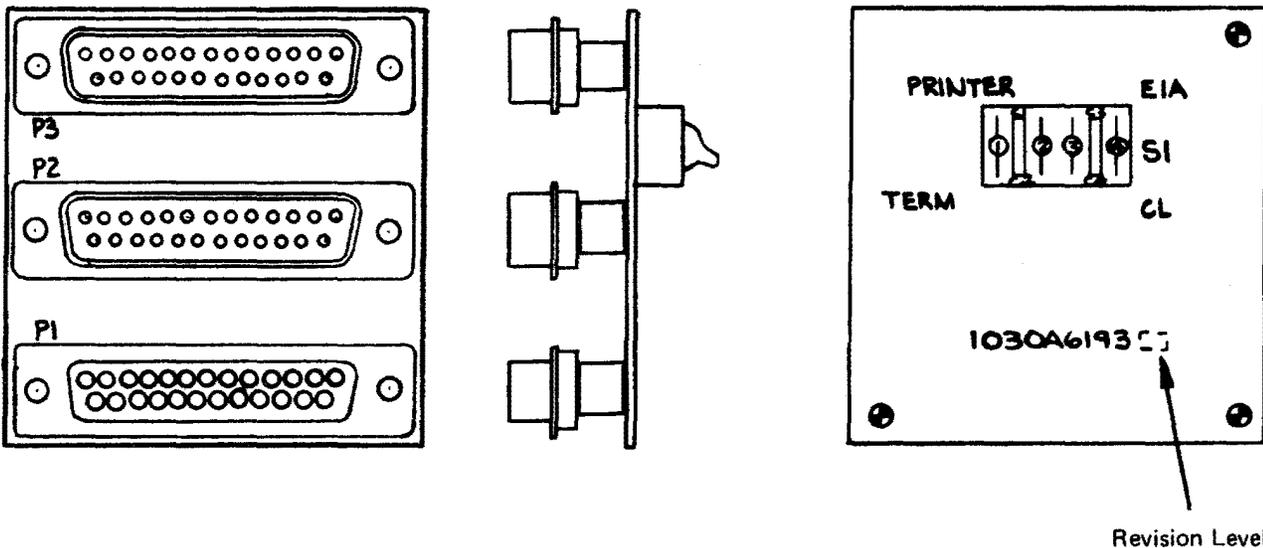
- (a) Remove the diagnostic test plug or any cables from the rear panel.
- (b) Set the Modem switch to 1.  
Set the binary switch to EXIT.  
Set the terminal switch to 0.  
Set the printer switch to 0.
- (c) Depress the RESTART button.
- (d) LED Test: The front panel LEDs will react immediately as follows:

**Requirement 1:** All the LEDs are lit (1 second).

**Requirement 2:** The READY 1 and BUSY 1 LEDs are lit (1/2 second). The READY 1 and BUSY 1 LEDs will illuminate randomly.

**Requirement 3:** After both the READY 1 and BUSY 1 LEDs go OFF the visual LED test will be performed. Each LED is lit independently and sequentially (1 second each) in a "walking" pattern. If a LED does not respond, it is defective.

**Requirement 4:** The READY 1 LED will come on again.



**Fig. 1—Diagnostic Test Plug**

**TABLE B**  
**LED DISPLAY (TEST A)**

BIT RATE SWITCH SETTING	LED DISPLAY			
	STATUS	CARRIER	BUSY(1)	READY(1)
BINARY VALUE	8	4	2	1
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON

**NOTE:** The LED display is a binary representation of the bit rate switch setting.

**TABLE C**  
**FAILURE INTERPRETATION**

TEST FAILURE	PROBABLE CAUSE
LED Test	Replace the communications ports board (LED driver circuit). If the LED still fails, replace the defective LED.
Bit Rate Switch	Replace the defective bit rate switch on microprocessor—RAM board. If switch still fails, replace the MP-RAM board (bit rate switch multiplexer).
Binary Switch	Replace the "ENTER/EXIT" switch on I/O panel. If switch still fails, replace the communications ports board.

(e) **Bit Rate and Binary Mode Switch Tests:**  
The switch test values are in a logical "0Red" state, and the test results are represented by the LED display.

**Requirement 1:** Set all bit rate switches to 0. At this time, the LEDs should be off (not lit).

**Requirement 2:** Move the binary mode switch to ENTER; the STATUS LED should be lit. Move the switch to EXIT; it should be off (not lit).

**Requirement 3:** Move the printer bit rate switch through its settings of 0 to 9. (The other switches must be set to 0.) Examine the LEDs at each setting and compare the values displayed with values in Table B. (Each bit

rate setting should generate a corresponding LED display.) If a LED display is incorrect, the switch is defective. Return the printer switch to 0 and follow the same procedure for the terminal and modem bit rate switches.

(f) Refer to Table C for failure interpretation.

#### Test B—Hardware Features Check

##### 5.07

- (a) Set the modem switch to 7.
- (b) Depress the RESTART button.
- (c) The Diagnostic will immediately perform the visual LED test. The user may also perform the Switch test or proceed to step d.

(d) Open and close the drive 1 door.

**Requirement:** All LEDs will blink in unison.

(e) The installed hardware features will be indicated by a series of LED on/off patterns. To obtain the first pattern, open and close the drive 1 door. Locate the LED on/off pattern on the Comm-Stor II/SMDR unit in the "LED Pattern" column of Table D. Then read across to the *first* pattern of the sequence to determine the hardware feature; record the feature.

(f) Open and close the drive 1 door again to obtain the second LED pattern and locate the associated option in the second

column. Follow this procedure until all five patterns have been obtained. When the last pattern has been displayed, all the LEDs will blink in unison.

For example, if the *third* pattern is:

STS	CAR	BSY (1)	RDY (1)
○	●	○	○
(OFF)	(OFF)	(ON)	(ON)

this would indicate that the unit has two drives and the standby mode is installed.

**Note 1:** The LED pattern must indicate the following hardware features for Bell System use:

**TABLE D  
HARDWARE FEATURES**

LED PATTERN				PATTERN SEQUENCE				
				1st	2nd	3rd	4th	5th
STS	CAR	BSY (1)	RDY (1)	EXPANDED RAM MEMORY SIZE	NUMBER OF DRIVES/STANDBY MODE	EDITOR/FORMS	PRINTER PORT/USER COMMAND TABLE	
○	○	○	○	---	---	-----	-----	
○	○	○	●	N/A	0K	1 DRIVE NO STAND-BY	N/A	NO PRINTER PORT NO EXTENDED USER COMMAND TABLE
○	○	●	○	N/A	4K	2 DRIVES NO STAND-BY	N/A	PRINTER PORT NO EXTENDED USER COMMAND TABLE
○	○	●	●	N/A	8K	1 DRIVE STAND-BY	N/A	NO PRINTER PORT EXTENDED USER COMMAND TABLE
○	●	○	○	N/A	12K	2 DRIVES STAND-BY	N/A	PRINTER PORT AND EXTENDED USER COMMAND TABLE
●	○	○	●	N/A	28K	-----	N/A	-----

ON ●  
OFF ○

Expanded RAM Memory Size: 28K  
 Number of Drives/Standby: 2 Drives,  
 Standby

Editor/Forms: N/A  
 Printer Port/User Command Table: Printer  
 Port and Extended User Command Table

Any other LED pattern indicates a hardware failure.

**Note 2:** If an installed feature is not indicated by the Diagnostic, the associated component(s) either malfunctioned or is not properly installed. A faulty component should be replaced. If a feature is not detected by this check, it will not be tested in any of the Diagnostics.

**Note 3:** RAM memory size is indicated by the first *or* second LED pattern. Therefore, one of these patterns will show *all the LEDs OFF*. For example, because the unit contains 28K of RAM memory, the first pattern will be:



The second pattern will be:



#### Test C—Internal Tests: Memory/Diskette/Timer/Bit Rate

##### 5.08

- (a) Remove the diagnostic test plug or any cables from the rear panel.
- (b) Set the modem switch to 2.
- (c) Depress the RESTART button.
- (d) The Diagnostic will immediately perform the visual LED Test. The user may also perform the Switch Test or proceed to step e.
- (e) Open and close the drive 1 door. The Diagnostic will execute the Internal Tests which will run about **10** minutes.
- (f) Upon completion of the test for drive 1, the READY 1 and BUSY 1 lights will blink in unison. Remove the User Diagnostic diskette from drive 1; insert it into drive 2 and close the drive door. Drive 2 tests will last about **3** minutes.

**Requirement:** When the Internal tests are completed, all the LEDs will blink in unison. The test results are stored in the tables in memory.

- (g) Open and close the drive 2 door.

**Requirement 1:** If at any time the LEDs blink in unison, go to step (h).

**Requirement 2:** If a series of LEDs are lit, refer to Table E for the first test results. If *no* LEDs are lit, go to requirement 3.

**Requirement 3:** Open and close the drive door again. If a series of LEDs are lit, refer to Table F for the second group of test results. If *no* LEDs are lit, go to requirement 4.

**Requirement 4:** Open and close the drive door again. If a series of LEDs are lit, refer to Table G for the third group of test results. If *no* LEDs are lit, go to requirement 5.

**Requirement 5:** Open and close the drive door again. If a series of LEDs are lit, refer to Table H for the fourth group of test results. If *no* LEDs are lit, go to requirement 6.

**Requirement 6:** Open and close the drive door again. If a series of LEDs are lit, refer to Table I for the final group of test results. If *no* LEDs are lit, go to requirement 7.

**Requirement 7:** Open and close the door to end the test. All LEDs will blink in unison.

- (h) If no further fault conditions exist, the test will end with all LEDs blinking in unison. Those fault tables bypassed by the Diagnostic procedure contain no reportable results.

#### Test D—Terminal and Modem Port Tests

##### 5.09

- (a) Remove the Diagnostic diskette from drive 2; insert the diskette into drive 1.
- (b) Mount the diagnostic test plug on the rear panel. Set switch 1 to the EIA position and switch 2 to the TERM position.
- (c) Set the modem switch to 3.
- (d) Depress the RESTART button.
- (e) The Diagnostic will immediately perform the visual LED test. The user may also perform the Switch test or proceed to step f.
- (f) Set the terminal switch, referring to Table J. The modem *and* terminal ports will be tested at the specified bit rate.

**TABLE E**  
**RAM FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY	The main memory is faulty. Random and unpredictable operating faults may occur.	Replace the MP-RAM board.
CARRIER or STATUS	The expanded memory is faulty.	Replace the Expanded RAM board.

**TABLE F**  
**CONFIGURATION MEMORY FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY	The main memory is faulty. Random and unpredictable operating faults may occur.	Replace the MP-RAM board.
BUSY	The Extended User Command Table is faulty.	Replace the MP-RAM board.

**TABLE G**  
**ROM/TIMER/BIT RATE FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY	The main memory is faulty. Random and unpredictable operating faults may occur.	Replace the ROM board.
BUSY	A timer fault has occurred.	Replace the Diskette Controller board, the Microprocessor board, or both
CARRIER	A bit rate generator is faulty.	Replace the EIA board or Printer board.

**TABLE H**  
**DRIVE 1 FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY	Diskette drive 1 cannot read properly.	Replace the diskette drive assembly. If drive 1 still fails, replace the diskette controller board and cable. Continued failure of drive 1 indicates a bad User Diagnostic diskette.
CARRIER or STATUS	Diskette drive 1 cannot write properly.	(same as above)

**TABLE I**  
**DRIVE 2 FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY	Diskette drive 2 cannot read properly.	Replace the diskette drive assembly. If drive 2 still fails, replace the drive controller board and cable. Continued failure of drive 2 indicates a bad User Diagnostic diskette.
CARRIER or STATUS	Diskette drive 2 cannot write properly.	(same as above)

**TABLE J**  
**BIT RATE SPECIFICATION**

<p>This table specifies the terminal, modem, and printer port bit rates. If the terminal and modem port rates are different, run the test twice (once at each bit rate).</p>	
DESIRED BIT RATE	TERM SWITCH SETTING
110	1
134	2
150	3
300	4
1200	5
2400	6
4800	7
7200	8
9600	9

(g) Open and close the drive 1 door. The Diagnostic will execute the terminal and modem port tests.

(h) The tests will run about 3 minutes.

**Requirement:** When the tests are completed, all LED lights will blink in unison.

(i) Open and close the drive 1 door.

**Requirement 1:** If at any time the LEDs blink in unison, go to step (j).

**Requirement 2:** If a series of LEDs are lit, refer to Table K for the first test results. If *no* LEDs are lit, go to requirement 3.

**Requirement 3:** Open and close the drive door again. If a series of LEDs are lit, refer to Table L for the second group of test results. If *no* LEDs are lit, go to requirement 4.

**Requirement 4:** Open and close the drive door again. If a series of LEDs are lit, refer to Table M for the third group of test results. If *no* LEDs are lit, go to requirement 5.

**Requirement 5:** Open and close the drive door again. If a series of LEDs are lit, refer to Table N for the fourth group of test results. If *no* LEDs are lit, go to requirement 6.

**Requirement 6:** Open and close the drive door to end the test. All LEDs will blink in unison.

**TABLE K**  
**TERMINAL RECEIVE/TRANSMIT FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY	The terminal port cannot receive and/or transmit characters properly.	Replace the communications ports board.
CARRIER	One or more of the following faults may occur: 1. The terminal port may not respond to a break (i.e., long space) from the terminal. 2. The terminal port cannot send a break to the terminal. 3. A terminal parity error indication may be falsely given.	Replace the communications ports board.
STATUS	The status light is not used.	

**TABLE L**  
**TERMINAL EIA CONTROL FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY BUSY CARRIER or STATUS	The terminal port is faulty .	Replace the communications ports board.

**TABLE M**  
**MODEM RECEIVE/TRANSMIT FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY  CARRIER         STATUS	<p>The modem port cannot receive and/or transmit characters properly.</p> <p>One or more of the following faults may occur:</p> <ol style="list-style-type: none"> <li>1. The modem port may not respond to a break (i.e., long space) from the data set.</li> <li>2. The modem port cannot send a break to the data set.</li> <li>3. A modem parity error indication may be falsely given.</li> </ol> <p>Under certain conditions, transmission from the modem to the terminal may be faulty.</p>	<p>Replace the communications ports board.</p> <p>Replace the communications ports board.</p> <p>Replace the communications ports board.</p>

**TABLE N**  
**MODEM EIA CONTROL FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY BUSY CARRIER or STATUS	The modem port is faulty.	Replace the communications ports board.

**TABLE O**  
**PRINTER RECEIVE/TRANSMIT FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY or BUSY	The printer port cannot transmit characters properly.	Replace the printer board.
CARRIER	The printer port may not be able to send a break (i.e., long space) to the printer.	Replace the printer board.
STATUS	The STATUS light is not used.	

**TABLE P**  
**PRINTER EIA CONTROL FAULTS**

LIGHT	INTERPRETATION	REMEDY
READY BUSY CARRIER or STATUS	The printer port is faulty.	Replace the printer board.

(j) If no further faults exist, the test will end with all LEDs blinking in unison. Those fault tables bypassed by the Diagnostic procedures contain no reportable results.

**Test E—Printer Port Test**

**5.10**

- (a) Mount the diagnostic test plug on the rear panel and set switches 1 and 2 to the EIA and PRINTER positions, respectively.
- (b) Set the modem switch to 5.
- (c) Depress the RESTART button.
- (d) The Diagnostic will perform the visual LED test. The user may also perform the Switch test or proceed to step e.
- (e) Set the terminal switch, referring to Table J.
- (f) Open and close the drive 1 door. The Diagnostic will execute the Printer Port test.

(g) The test will run about 3 minutes.

**Requirement:** When the test is completed, all LED lights will blink in unison.

(h) Open and close the drive 1 door.

**Requirement 1:** If at any time the LEDs blink in unison, go to step (i).

**Requirement 2:** If a series of LEDs are lit, refer to Table O for the first test results. If *no* LEDs are lit, go to requirement 3.

**Requirement 3:** Open and close the drive door again. If a series of LEDs are lit, refer to Table P for the second group of test results. If *no* LEDs are lit, go to requirement 4.

**Requirement 4:** Open and close the drive door again. If a series of LEDs are lit, refer to Table M for the third group of test results. If *no* LEDs are lit, go to requirement 5.

**Requirement 5:** Open and close the drive door again. If a series of LEDs are lit, refer to Table N for the fourth group of test results. If *no* LEDs are lit, go to requirement 6.

**Requirement 6:** Open and close the door to end the test. All LEDs will blink in unison.

- (i) If no further faults exist, the test will end with all LEDs blinking in unison. Those tables bypassed by the Diagnostic procedures contained no reportable results.

**Test G—Configuration Memory Test**

5.11

- (a) Remove the diagnostic test plug from the back panel.
- (b) Set the modem switch to 8. Set the terminal switch to 0.
- (c) Depress the RESTART button.
- (d) The Diagnostic will immediately perform the visual LED test. The user may also perform the Switch test or proceed to step e.
- (e) Open and close the drive 1 door. The Diagnostic will execute the Configuration Memory test.

**Requirement:** When the BUSY LED comes on and stays on, turn the Comm-Stor II/SMDR unit OFF.

- (f) Wait about 1 minute. Turn the Comm-Stor II/SMDR unit ON; the Diagnostic will again perform the visual LED test.

**Requirement 1:** Open and close the drive 1 door. If the BUSY LED or CARRIER LED begins blinking, refer to Table Q.

**TABLE Q**

**CONFIGURATION MEMORY FAULTS—TEST G**

BLINKING LIGHT:	INTERPRETATION
BUSY	The battery or the main configuration memory is faulty.
CARRIER	The battery or the Extended User Command Table memory is faulty.

**Requirement 2:** If no faults occur, the BUSY LED will come on and stay on. Turn the Comm-Stor II/SMDR unit off and proceed to step g.

- (g) Wait about 1 minute. Turn the Comm-Stor II/SMDR unit ON; the Diagnostic will again perform the visual LED test. Open and close the drive 1 door.

**Requirement:** If no faults occur, all LEDs will blink in unison. If the BUSY LED or CARRIER LED begins blinking, refer to Table Q.

**Note:** The user should wait at least 1 minute between steps e, f, and g. However, if the suspected Configuration Memory fault is time related, more or less time may be required between steps for the fault to appear.

If the problem is heat related, the user may depress the RESTART button between steps rather than turn the Comm-Stor II/SMDR unit OFF.

- (h) The Diagnostic diskette may be removed at this time.

or

Leave the Diagnostic diskette in the drive and proceed to the **Diskette Test**.

**Test H—Diskette Test**

5.12

**Note:** The user should first verify the system's operation by running the Internal tests.

- (a) Set the modem switch to 9.
- (b) Depress the RESTART button.
- (c) The Diagnostic will immediately perform the visual LED test. The user may also perform the Switch test or proceed to step d.
- (d) Open and close the drive 1 door.

**Requirement 1:** When the READY and BUSY LEDs begin blinking, remove the Diagnostic diskette. Insert the diskette to be tested into drive 1; close the drive door.

**Requirement 2:** The READY 1 and BUSY 1 LEDs will stop blinking but remain on while the test is performed. The test will run about 2 minutes.

**Requirement 3:** If the test is completed without errors, the READY 2 and BUSY 2 LEDs will start blinking. This indicates that data stored on the diskette can be read without errors. The diskette should be removed from drive 1; another diskette may be inserted and tested at this time. (Additional diskettes may be tested by alternating between drives 1 and 2).

**Requirement 4:** If an error occurs, a CARRIER LED will blink; the faulty diskette should be removed. The user must insert the Diagnostic diskette and return to step (b) to perform additional diskette tests. The user may attempt to copy the faulty Data diskette in order to save valuable data. The faulty diskette should then be discarded as DISKETTE ERROR or READ ERROR messages may occur. This is usually caused by a scratch on the diskette. Review the diskette handling procedures.

**Test M—RAM Memory Test**

5.13 The purpose of this test is to provide a detailed analysis of the problem area in RAM Memory (refer to Table R). This test need only be run if a RAM failure existed during Test C in Table E or F.

- (a) Connect a terminal to the Comm-Stor II/SMDR unit's terminal port.
- (b) Turn the Comm-Stor II/SMDR unit ON.
- (c) Set the binary switch to EXIT.
- (d) Remove any diskettes from the drives. Insert a System Management diskette into drive 1. The System Management menu is displayed. Type 9 followed by a Carriage Return to refresh the system. The Refresh procedure ensures that the Comm-Stor II/SMDR unit is set to the standard factory configuration.
- (e) Type 0[CR]. Remove the System Management diskette.
- (f) Insert the Diagnostic diskette into drive 1; close the drive door.

(g) Set the terminal bit rate switch for the appropriate bit rate. Set the modem switch to 0 and the printer switch to 0. Set the binary switch to ENTER.

(h) Depress the RESTART button. The Comm-Stor II/SMDR unit will automatically perform the LED test (Test A).

(i) After a slight delay, the Comm-Stor II/SMDR unit displays the following command:

ENTER A COMMAND FOLLOWED BY A RETURN

#

Type the letter "M" on the terminal followed by a Carriage Return. The following statement will be displayed:

STANDARD RAM?

Now type "Y" followed by a Carriage Return.

(j) The system will print the following question at the terminal:

EXP RAM?

Type "Y" followed by a Carriage Return. The memory test will now begin.

**Requirement 1:** The following table will be displayed at the terminal:

Global W/R Test

Bank	LOC	Write	Read
XX			
XX			

Where: BANK = hexadecimal RAM Bank number

LOC = hexadecimal memory address

WRITE = a 1 or a 0 indicates the logic level of each data bit written into RAM

READ = a 1 or a 0 indicates the logic level of each data bit read from RAM.

**TABLE R**  
**USER DIAGNOSTIC MEMORY TEST**

ADDRESS RANGE	FUNCTION	CIRCUIT BOARD	IC LOCATION BIT POSITIONS							
			7	6	5	4	3	2	1	0
0020-03FF	RAM	MP-RAM	D3	D1	C3	C1	B3	B1	A3	A1
0400-07FF	RAM	MP-RAM	D4	D2	C4	C2	B4	B2	A4	A2
0800-08FF	Configuration Memory (CMOS)	MP-RAM	E2	E2	E2	E2	F3	F3	F3	F3
0900-09FF	Extended User Command Table (CMOS)	MP/RAM	A5	A5	A5	A5	B5	B5	B5	B5
1000-1FFF(4K)	RAM	16K RAM Memory	A1	B1	C1	D1	E1	F1	H1	J1
2000-2FFF(8K)	RAM	16K RAM Memory	A2	B2	C2	D2	E2	F2	H2	J2
3000-3FFF(12K)	RAM	16K RAM Memory	A3	B3	C3	D3	E3	F3	H3	J3
4000-4FFF(16K)	RAM	16K RAM Memory	A4	B4	C4	D4	E4	F4	H4	J4
5000-5FFF(20K)	RAM	24K RAM Memory	F1	H1	J1	K1	L1	M1	N1	P1
6000-6FFF(24K)	RAM	24K RAM Memory	F2	H2	J2	K2	L2	M2	N2	P2
7000-7FFF(28K)	RAM	24K RAM Memory	F3	H3	J3	K3	L3	M3	N3	P3

1. If an error occurs in a RAM test, the location of the error (Hexadecimal Address) and the bits in error (A "1" indicates a defective bit) can be used to locate the defective RAM IC. Bits in error are arranged 76543210 on the failure printout.

**Example:**

LOCATION OF ERROR = 10FF  
BITS IN ERROR = 00010000

Bit 4

The defective IC can be pinpointed to D1 on the 16K RAM memory board using the above chart.

2. A RAM failure which is not solved by replacing the RAM IC requires troubleshooting the address decoding circuitry on the board in question.

The Global Write/Read test writes a unique value (an ascending number) into each memory location. After the entire memory is written into, each location is read and compared to the expected value. This test will detect addressing faults in both the address logic and in the memory chips themselves. Only the first error in each bank is reported.

**Requirement 2:** After completing the above test, the Comm-Stor II/SMDR unit will print GLOB PAT and begin execution. This test writes a unique pattern into memory. After the entire memory is written, it is read back and a comparison is made. The test is repeated 7 times with a different pattern used each time. This test will detect pattern sensitivity and addressing faults.

**Requirement 3:** After completing the Global Pattern Test, the Comm-Stor II/SMDR unit will respond with the following message:

PRESS RETURN KEY

Depress the Carriage Return key to perform the final test, W/R ALL V.

This performs a write/read test at each location, writing and reading four different hexadecimal values in the following sequence:

- (1) Write the value.
- (2) Read the location (up to 6 tries) until the correct value is read.
- (3) If the correct value cannot be read, go back and write it again.
- (4) If it still cannot be read (6 tries), repeat the cycle up to 6 times until the correct value is read.

When an error is found (even if it disappears during retry), no more locations in that bank are tested. The test advances to the next bank.

A typical error display is:

BANK	LOC	WRITE	READ	
02	0801	1100.0010	1100.0000	5 4
				↑
				↑

The number of write tries.

The number of read tries after the last write.

If the value cannot be read after 6 read-write cycles, an H (HARD ERROR) is displayed in place of the retry numbers.

At the completion of this test it will loop to the beginning.

**Test V—Drive/Diskette Verify Test**

**5.14** This test provides a means of reading and verifying track/sector identification fields (IDs) and data CRC characters for every sector on the diskette.

**5.15** The main purpose of this test is to check the diskette drive and the diskette drive electronics' ability to read. If marginal problems exist, it is imperative that the test be run with several other diskettes or a known good diskette.

**5.16** This test can also be used to check and verify diskettes. After the diskette drive and electronics have been verified by successfully reading known good diskettes, the Verify test can be used to verify questionable diskettes. Marginal or bad sectors are indicated by a display which indicates the track number (0-76), the sector number (01-26), and an "S" which indicates a Search Error or "CC" which indicates a CRC or data error.

- (a) Turn the Comm-Stor II/SMDR unit ON.
- (b) Connect a terminal to the Comm-Stor II/SMDR unit's terminal port.
- (c) Set the binary switch to EXIT.
- (d) Remove any diskettes from the drives. Insert the System Management diskette into drive 1. The System Management menu is displayed. Type 9 followed by a Carriage Return to refresh the system. The Refresh procedure ensures that the Comm-Stor II/SMDR unit is set to the standard factory configuration.
- (e) Type 0[CR]. Remove the System Management diskette.
- (f) Insert the Diagnostic diskette into drive 1; close the drive door.
- (g) Set the terminal bit rate switch for the appropriate bit rate. Set the modem switch to 0 and the printer switch to 0. Set the binary switch to ENTER.
- (h) Depress the RESTART button. The Comm-Stor II/SMDR unit will automatically perform the LED test (Test A).
- (i) After a slight delay, the Comm-Stor II/SMDR unit displays the following command:  
  
ENTER A COMMAND FOLLOWED BY A RETURN  
  
#  
  
Type the letter "V" followed by a Carriage Return. The following statement will be displayed:  
  
INSERT IN
- (j) Test the system's ability to read a diskette. Insert a known good diskette into drive 1 *or* drive 2.

**Note:** Marginal diskettes can be tested in known good systems using the same procedure.

- (k) After the scratch diskette has been inserted, the following message will be displayed on the terminal:

TRK

Answer this prompting message with the decimal number of the track to be tested (0-76), or answer it with an upper case "A" which designates all tracks and sectors on the diskette.

- (l) Type a Carriage Return; the following prompt statement will be displayed on the terminal:

ID REV

Answer this message with a "C". The "C" causes the same search retry sequence used by the Comm-Stor II/SMDR unit in normal operation (up to 12 search retries). If marginal diskettes are being tested, a number 1 through 9 can be entered to limit the number of search retries.

Limiting the number of retries will greatly increase the probability of an error indication when the diskette or diskette drive electronics are marginal.

**Note:** It is normal to have some search errors when ID REVS equal 1 or 2.

- (m) The test will begin automatically after a Carriage Return has been typed following the ID REVS number.

The following table will be displayed:

TRK	SEC	TRK = track number
		SEC = sector number
RUN 1		RUN 1 = test cycle 1
XX	YY ZZ	If Read errors occur.

Read errors are indicated in the above table by the track (XX) and sector (YY) numbers where the error occurred. The third column (ZZ) describes the type of error: S = "search" or "diskette" type ID error; CC = "CRC" or "Bad Read" type data error.

The beginning of each read cycle is indicated by the display RUN 1, RUN 2, RUN 3, etc.

The test will run continuously until interrupted. Depress the Carriage Return key to stop the test and return the procedure to the TRK message. Strike the letter "I" followed by a Carriage Return to return to the INSERT IN message.

**Test CM—Configuration Memory Test**

5.17 This test will confirm the ability of configuration memory to retain information when the main power is disconnected.

5.18 This test should be run if the unit fails to configure properly or loses parameters after refreshed.

5.19 The test procedure will:

Read the previous configuration memory page 0 and page 1 into RAM memory from the diskette.

Compare this image with the contents of page 0 and page 1.

Report if the compare was "Good" or "Bad" for page 0 and page 1.

Write the contents of both configuration memory pages out to the diskette.

- (a) Connect a terminal to the Comm-Stor II/SMDR unit's terminal port.
- (b) Turn the Comm-Stor II/SMDR unit ON.
- (c) Set the binary switch to EXIT.
- (d) Remove any diskettes from the drives. Insert the System Management diskette into drive 1. The System Management menu is displayed. Type 9 followed by a Carriage Return to refresh the system. The Refresh procedure ensures that the Comm-Stor II/SMDR unit is set to the standard factory configuration.
- (e) Type 0[CR]. Remove the System Management diskette.
- (f) Insert the Diagnostic diskette into drive 1; close the drive door.
- (g) Set the terminal bit rate switch for the appropriate bit rate. Set the modem switch to 0 and the printer switch to 0. Set the binary switch to ENTER.

- (h) Depress the RESTART button. The Comm-Stor II/SMDR unit will automatically perform the LED test (Test A).
- (i) After a slight delay, the Comm-Stor II/SMDR unit displays the following command:

ENTER A COMMAND FOLLOWED BY A RETURN

#

Type the letter "C" followed by a Carriage Return. The following question will be displayed:

EXT TABLE?

Type "Y" followed by a Carriage Return.

**Requirement:** The test will execute and print the following information:

PAGE 1 (GOOD or BAD)

EXT TABLE (GOOD or BAD)

**Note:** The test results should be ignored the first time the test is run. This enables the system to write the contents of configuration memory onto the diskette. When the question "EXT TABLE?" is asked again, the results will be valid.

- (j) Two test sequences are possible:

- Sequence 1:
- (a) Run the test.
  - (b) Turn power OFF, wait 5 seconds, restore power.
  - (c) Repeat the test immediately.

Sequence 1 will confirm the following hardware components:

The configuration memory chips in their power down mode.

The configuration memory support chips.

The on-board filter capacitor (which acts as a short-term power source for the configuration memory system).

- Sequence 2:
- (a) Run the test.
  - (b) Turn power OFF.
  - (c) Wait until the next day to repeat the test.

Sequence 2 will confirm the previous hardware as well as the operation of the battery on the mother board.

This test will not alter configuration memory.

## 6. CHECKLIST #1—DIAGNOSTIC DOES NOT RUN

6.01 Table S lists the most common causes for failure of the Comm-Stor II/SMDR unit. Observe the symptoms and proceed with the indicated remedies.

**TABLE 5**  
**CHECKLIST #1**

SYMPTOM	REMEDY
<p><b><i>Unit is completely dead.</i></b> Cooling fan is not spinning, drive motor is not spinning, no illumination of power switch, no front panel LED illumination.</p>	<ul style="list-style-type: none"> <li>(a) Reset the circuit breaker by pushing the power switch/circuit breaker button located on the back panel.</li> <li>(b) Check the power outlet for 115 VAC.</li> <li>(c) Remove the top cover. Check the power harness connectors to make sure they are mated together properly and there are no loose wires.</li> <li>(d) Check the AC power connections at the power supply (red and gray wires).</li> <li>(e) With the unit <b><i>unplugged</i></b>, check the continuity of the power switch/circuit breaker, and the harnessing.</li> </ul>
<p><b><i>No power indication.</i></b> No illumination of power switch. No illumination of LEDs when system turned ON or restarted.</p>	<ul style="list-style-type: none"> <li>(a) Check DC power supply voltages at base card edge connectors:                             <ul style="list-style-type: none"> <li>5.1—5.2 VDC @ pins 5, 6</li> <li>23.0—25.0 VDC @ pins 7, 8</li> <li>11.0—13.0 VDC @ pins 99, 100</li> <li>-11.0—13.0 VDC @ pins 97, 98</li> <li>Ground @ pins 1, 2, 66</li> </ul> <p>If one or more of the DC voltages are not present at the base card edge connector, refer to Section 578-400-750, "Routine Maintenance Procedures" for power supply adjustment procedure.</p> </li> <li>(b) If one or more of the power supply voltages are low, the power supply may be defective; or a defective component on one of the circuit boards could be loading down a particular voltage. Swap/verify the power supply. Swap/verify the circuit boards one at a time.</li> </ul>
<p><b><i>LEDs do not illuminate when the unit is restarted.</i></b> No head load solenoid activity when the unit is restarted with a diskette inserted.</p>	<ul style="list-style-type: none"> <li>(a) Check DC voltages (refer to section B, above) at base card edge connector.</li> <li>(b) Check battery voltage for 3.5 VDC MINIMUM.</li> <li>(c) Check battery connections.</li> <li>(d) Check front panel LED harness connection at the communications ports board.</li> </ul>

**TABLE 5 (Cont)**

**CHECKLIST #1**

SYMPTOM	REMEDY
<p><i>LEDs light for one second and go off, but User Diagnostic does not load from the diskette.</i></p>	<ul style="list-style-type: none"> <li>(e) If all the DC voltages appear to be normal, follow the sequences below:                             <ul style="list-style-type: none"> <li>(1) Turn the unit OFF; remove the diskette controller board, and turn the unit ON. If LEDs come on, the problem is in the diskette controller board or diskette drive assembly. Swap/verify these assemblies one at a time.</li> <li>(2) Turn the unit OFF; remove the printer option board if installed, and turn the unit ON. If the LEDs come on, the problem is in the printer option board.</li> <li>(3) Turn the unit OFF; swap/verify the MP-RAM board.</li> <li>(4) Turn the unit OFF; swap/verify the ROM board.</li> <li>(5) Turn the unit OFF; swap/verify the base card.</li> </ul> </li> <li>(a) Check the User Diagnostic diskette on another unit.</li> <li>(b) Check for drive motor rotation.</li> <li>(c) Swap/verify the drive ribbon wire cables.</li> <li>(d) Swap the diskette drive assembly and restart the test.</li> <li>(e) Swap/verify the diskette controller board.</li> <li>(f) Swap/verify the remaining circuit boards one at a time.</li> </ul>